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SUPPLEMENT TO ECONOMIES OF SCALE IN TURKEY HATCHERIES

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JUL 16 1965
CURRENT SERIAL RECORDS

Supplement to Marketing Research Report No. 719, July 1965

Economic Research Service
U. S. Department of Agriculture

PREFACE

This supplement is designed to be used with Marketing Research Report No. 719, "Economies of Scale in Turkey Hatcheries."

The first part of this supplement describes the 11 basic variable labor inputs in the normal operation of turkey hatcheries.

The second part contains layouts of the 6 different size model turkey hatcheries that were developed and described in Marketing Research Report No. 719.

The tables provide (1) detailed data on the costs of operating the model hatcheries at 40, 60, 80, and 100 percent of 52-and 34-week capacities, (2) detailed information on the quantity and cost of the equipment and supplies used in the model hatcheries, and (3) the work schedules that would allocate efficiently the labor utilized in pulling the infertile eggs on the eighth or ninth day of the hatching cycle in the model turkey hatcheries.

A selected bibliography of studies on the turkey industry, the hatching phase of the poultry industry, and economies of scale, concludes this supplement.

Data for this supplement were compiled by John R. Pedersen of the Marketing Economics Division, Economic Research Service, U. S. Department of Agriculture.

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DESCRIPTION OF TURKEY HATCHERY OPERATIONS

The methods used, by the hatcheries surveyed, to perform the various operations of a turkey hatchery were similar and most were performed with a minimum of laborsaving equipment (See "Economies of Scale in Turkey Hatcheries," MRR 719). A description of the 11 basic variable labor inputs is given below.

Receive and Store Eggs

Cases of eggs (20 dozen eggs per case) were unloaded from trucks and moved by hand, on dollies, or on roller conveyors to an egg storage room generally located near the unloading dock. The operation generally required two men.

Grade and Tray Eggs

The cases of eggs were moved from the egg storage room to the traying area by hand-carrying individual cases or by using a dolly. The operator opened the egg case and transferred eggs to an incubator tray by hand or vacuum-lift machine. When the tray was filled, paper was stuffed into one end of the tray to prevent movement of the eggs, and an identifying label was attached. The filled tray was placed on a cart, an empty tray was positioned, and the operation was repeated. One to two operators filled the trays. Occasionally a third operator kept the others supplied with eggs and trays, moved the trayed eggs to the incubators or back to the storage room, and moved the empty egg cases to the loading dock for future use.

Set Eggs in Incubator

The carts of full trays were wheeled up to the incubators and the trays were transferred to the racks in the incubator. The incubator was first vacuum cleaned of the remains of the previous set of eggs. One man usually performed these two functions.

Pull Infertile Eggs

On the seventh to the tenth day after the eggs were set, the trays were removed from the incubator and placed over a flash-candling light. Some firms candled each egg individually by hand methods. The clears, or infertile eggs, were removed by hand and placed loose in egg cases. The fertile eggs were consolidated to make full trays and placed back into the incubators. A new set of eggs were made to refill the incubator. These operations required from two to six employees depending on the size of hatchery.

Transfer Eggs

On the 24th day of incubation, the trays of eggs were transferred from the incubating units to the hatching units. The eggs were placed in hatcher trays that were lined with tray paper before being placed into the hatching units. If the infertile eggs were not pulled on the seventh through the tenth day of the incubation period, they were pulled before the eggs were placed in the hatcher trays. The transfer operation required one or two persons. If infertiles were also removed the entire operation required from two to six persons.

Pull Hatch, Grade, Count, and Box Poults

On the 28th day of the hatching cycle, the trays containing poults and unhatched eggs were removed from the hatchers. The trays were carried either by hand or by cart to work benches in the poult room where the poults were graded, counted, and placed into readymade boxes. Lids were secured on the boxes, which generally had 102 poults per box. The boxes were placed on carts and wheeled to the shipping area. Workers removed the labels from the trays as they were emptied and recorded the information concerning hatchability and fertility. The dirty trays were placed on dollies and taken to the tray wash area. Two to eight people were involved in this process.

Load Out Poults

Boxes of poults were loaded into trucks and stacked in columns. As each column was filled, the boxes were secured to prevent shifting. Two men were involved in this operation and they generally used dollies or roller conveyors to load the boxes.

Clean Hatcher Trays

Trays were washed by hand or by an automatic tray washer. The contents of each tray were first dumped into refuse cans, then the tray was scrubbed by hand and placed on a cart to dry. If a tray washer was used, the tray was emptied of trash and then hung on a circular conveyor which moved through the washer. The clean tray was removed and placed on a cart to dry. When the trays were dry they were moved to the transfer area for future use. Generally one person performed these duties.

Clean Hatchers

A hatcher had to be vacuumed, washed, and disinfected after each hatch was removed. Usually one man was responsible for this activity.

Assemble Poult Boxes

Poult boxes were received tied in bundles and were assembled before use. The boxes and lids were assembled, pads were placed in each box, and the boxes were stacked for future use. One person usually assembled the boxes.

Clean Hatchery

The hatchery was cleaned regularly by vacuuming and scrubbing the floors of the hatchery, office, and rest rooms, and performing other custodial chores. A sanitized hatchery can usually be maintained by utilization of otherwise idle man-hours of one or two employees.

LAYOUT OF MODEL TURKEY HATCHERY A

Annual Capacity About 1 Million Eggs

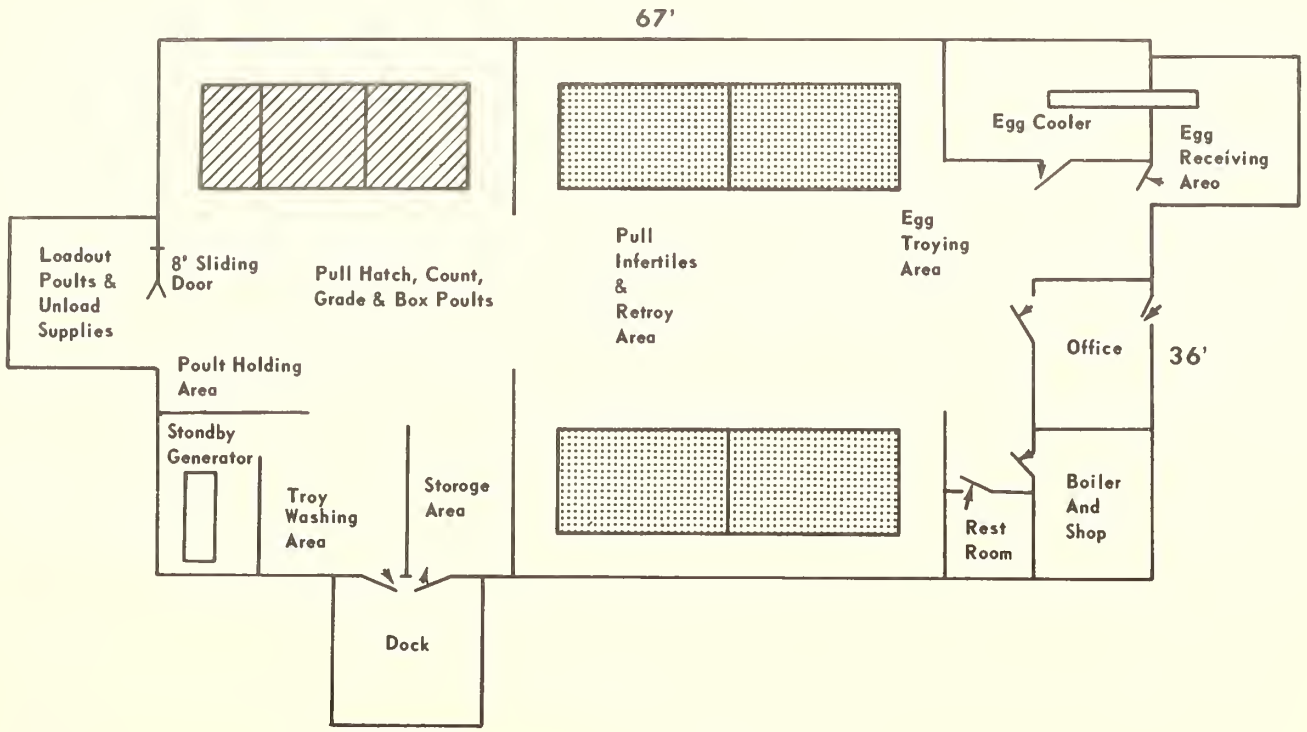

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Figure 1

LAYOUT OF MODEL TURKEY HATCHERY B

Annual Capacity About 2 Million Eggs

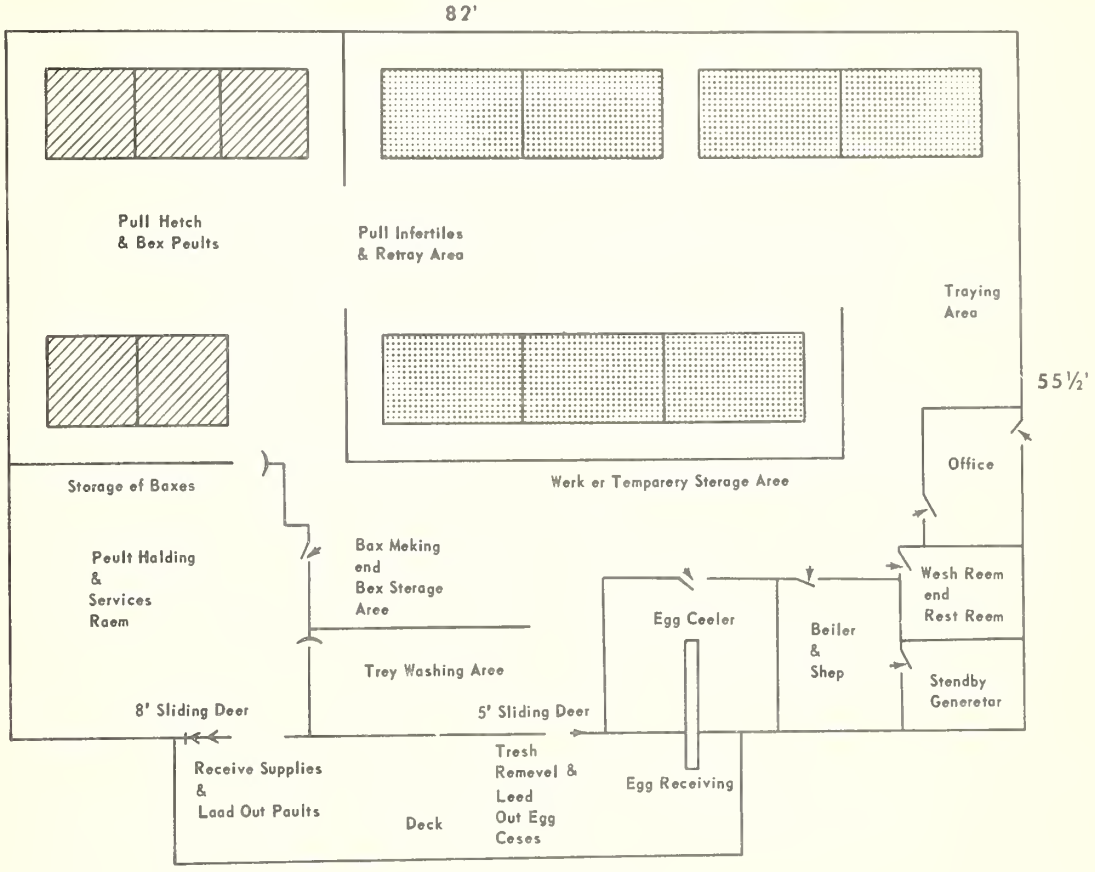

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Figure 2

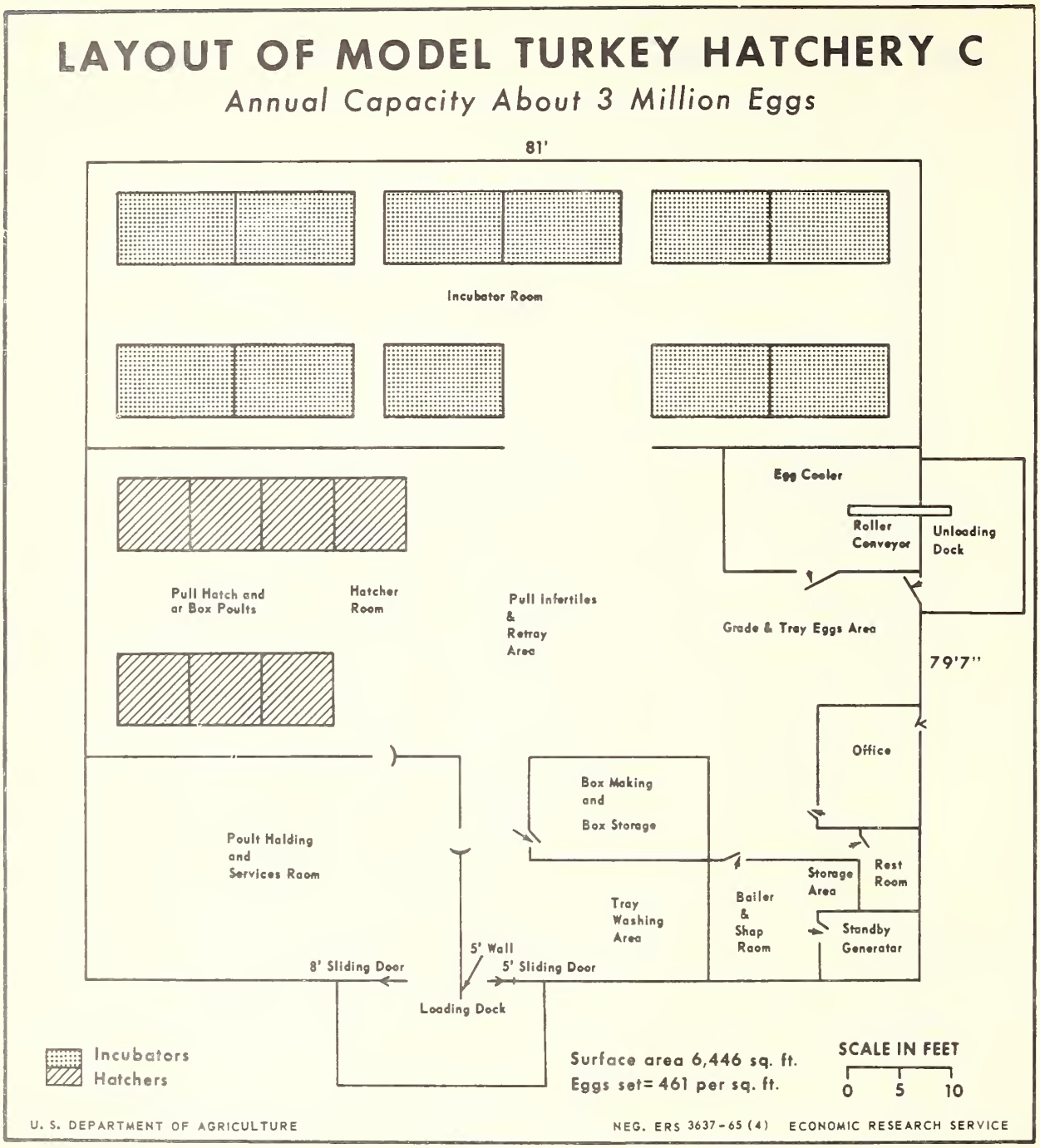
LAYOUT OF MODEL TURKEY HATCHERY C
Annual Capacity About 3 Million Eggs
81'
Incubator Room
Egg Cooler
Roller Conveyor
Unloading Dock
Pull Hatch and ar Box Poults
Hatcher Room
Pull Infertiles & Retray Area
Grade & Tray Eggs Area
79'7"
Office
Box Making and Box Storage
Poult Holding and Services Room
Storage Area
Rest Room
Tray Washing Area
Boiler & Shop Room
Standby Generator
5' Wall
8' Sliding Door
5' Sliding Door
Loading Dock
Incubators
Hatchers
Surface area 6,446 sq. ft.
Eggs set= 461 per sq. ft.
SCALE IN FEET
0 5 10
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Figure 3

LAYOUT OF MODEL TURKEY HATCHERY D

Annual Capacity About 5 Million Eggs

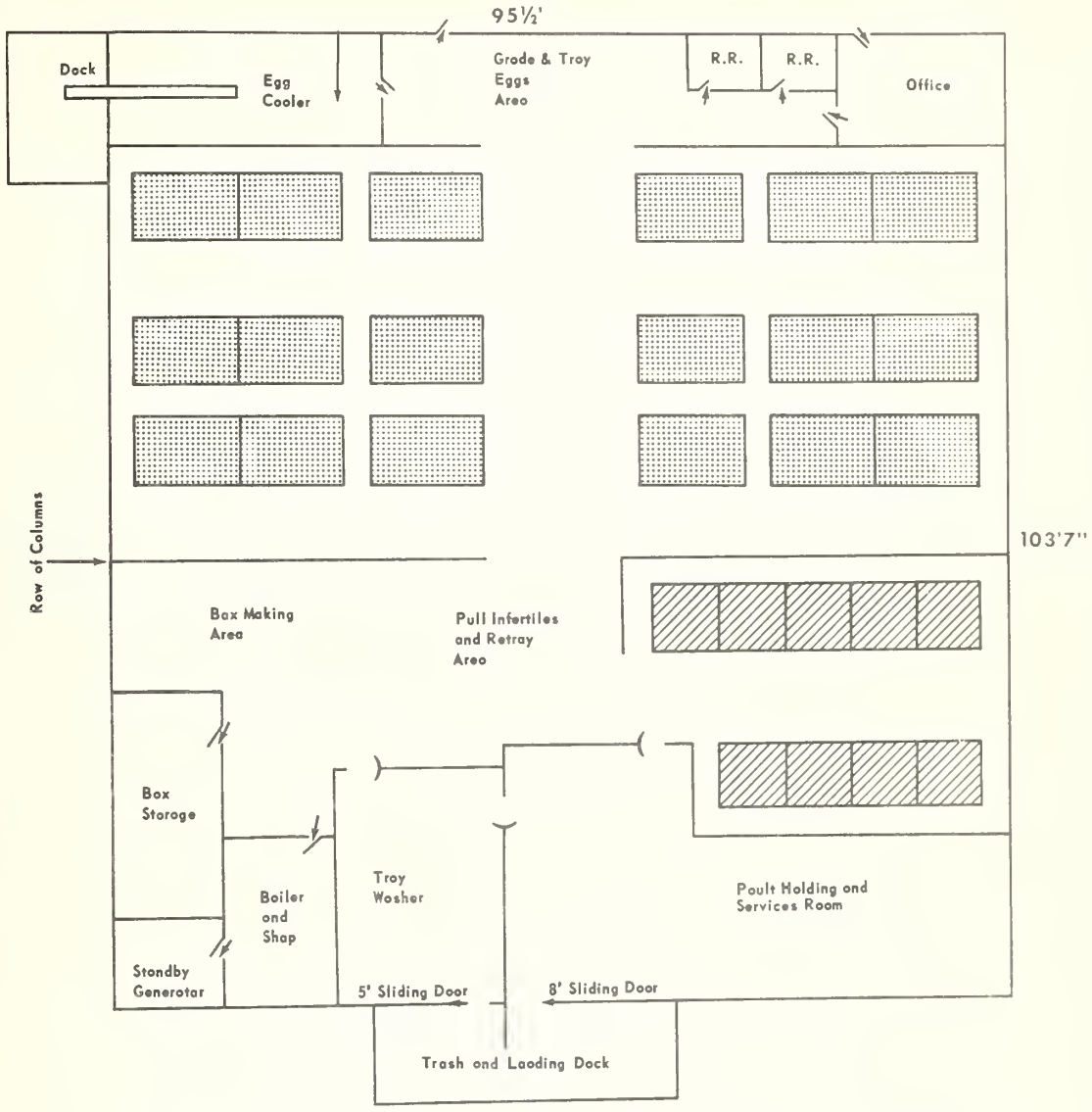


Figure 4

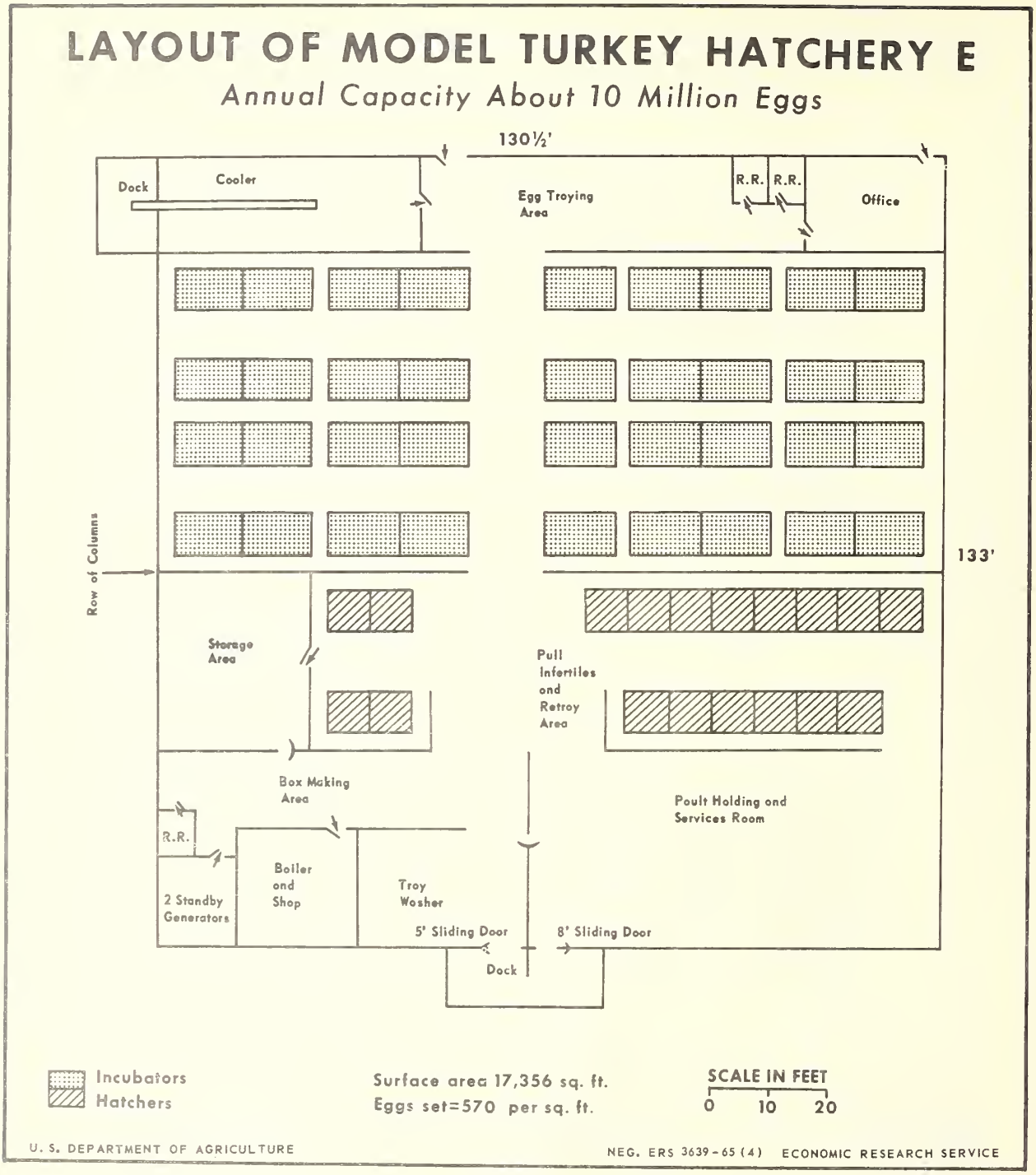
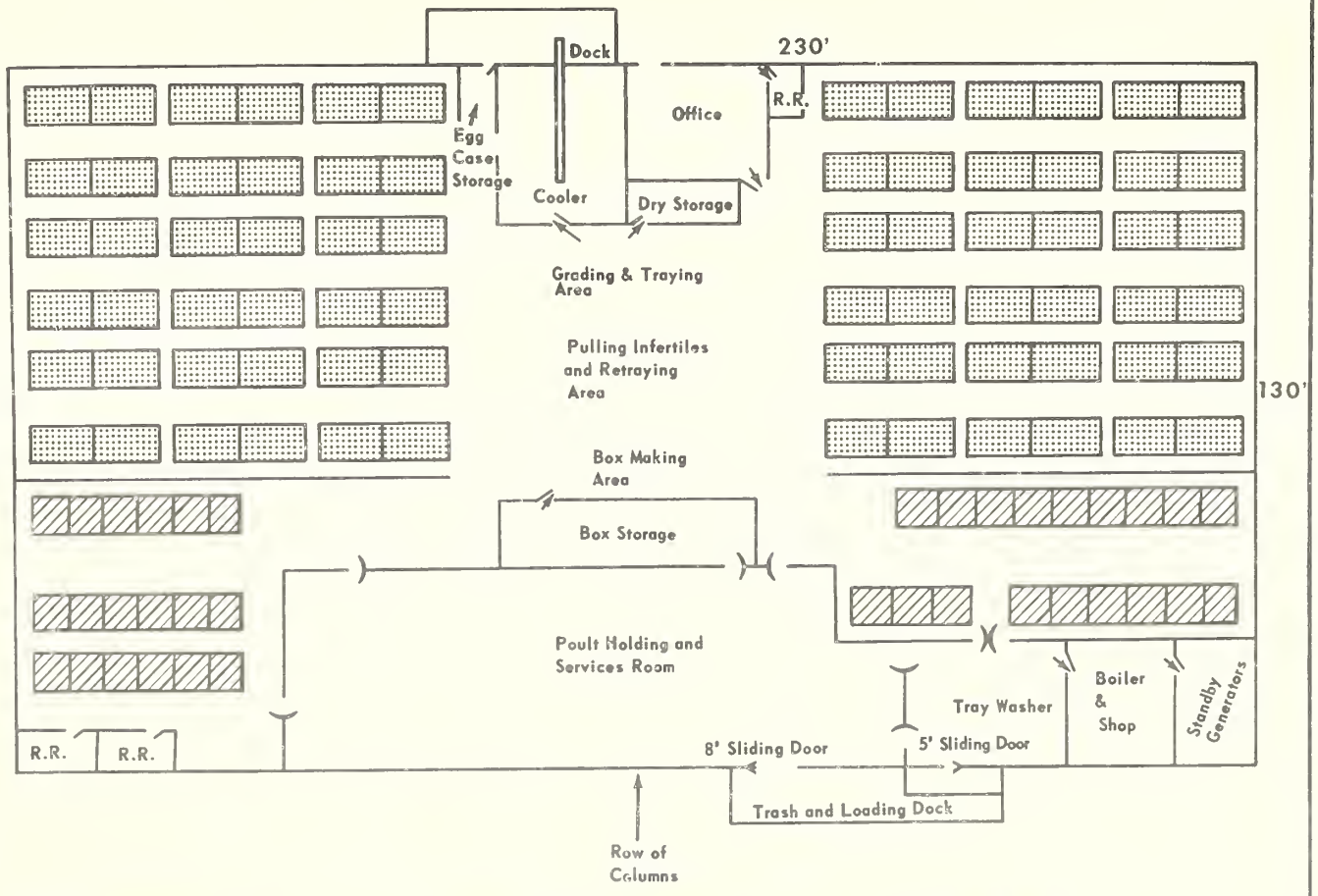

LAYOUT OF MODEL TURKEY HATCHERY E
Annual Capacity About 10 Million Eggs
130½'
Dock
Cooler
Egg Troying Area
R.R.
R.R.
Office
133'
Row of Columns
Storage Area
Pull Infertiles and Retroy Area
Box Making Area
Poult Holding and Services Room
R.R.
Boiler and Shop
2 Standby Generators
Troy Washer
5' Sliding Door
8' Sliding Door
Dock
Incubators
Hatchers
Surface area 17,356 sq. ft.
Eggs set=570 per sq. ft.
SCALE IN FEET
0 10 20
U. S. DEPARTMENT OF AGRICULTURE
NEG. ERS 3639-65 (4) ECONOMIC RESEARCH SERVICE

Figure 5

LAYOUT OF MODEL TURKEY HATCHERY F

Annual Capacity About 20 Million Eggs



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NEG. ERS 3640-65 (4) ECONOMIC RESEARCH SERVICE

Figure 6

Table 1.--Estimated hatching costs for six model hatcheries at various capacities, 52-week season

Cost components	Plant A					Plant B				
	Total cost	Cost per poult				Total cost	Cost per poult			
		100% cap.	80% cap.	60% cap.	40% cap.		100% cap.	80% cap.	60% cap.	40% cap.
	Dollars	Cents	Cents	Cents	Cents	Dollars	Cents	Cents	Cents	Cents
Fixed costs										
Equipment depreciation 1/	2,553.98	0.4608	0.5756	0.7680	1.1521	4,160.05	0.3753	0.4691	0.6255	0.9383
Building depreciation	900.00	.1624	.2028	.2707	.4060	1,700.00	.1534	.1917	.2556	.3834
Building repairs and maintenance	555.00	.1001	.1251	.1669	.2504	1,035.00	.0934	.1167	.1556	.2334
Equipment repairs and maintenance	1,454.81	.2625	.3279	.4375	.6562	1,801.19	.1625	.2031	.2708	.4062
Taxes	456.37	.0823	.1029	.1372	.2059	790.63	.0713	.0892	.1189	.1783
Insurance	456.37	.0823	.1029	.1372	.2059	790.63	.0713	.0892	.1189	.1783
Interest	1,369.10	.2470	.3086	.4117	.6176	2,371.89	.2140	.2675	.3566	.5350
Miscellaneous costs	500.00	.0902	.1127	.1504	.2255	1,500.00	.1353	.1692	.2255	.3383
Average total fixed costs	---	1.4876	1.8585	2.4796	3.7196	---	1.2765	1.5957	2.1274	3.1912
Variable costs										
Utilities	---	.9968	.9968	1.0550	1.1400	---	.6797	.6797	.9050	.9968
Supplies	---	.6173	.6173	.6225	.6260	---	.6069	.6069	.6140	.6173
Labor:										
Full time	4,304.04	.7766	.9700	---	---	7,743.84	.6986	.8733	---	---
60% capacity	2,839.20	---	---	.8538	---	5,110.56	---	---	.7684	---
40% capacity	1,893.84	---	---	---	.8543	3,407.04	---	---	---	.7684
Average total variable costs	---	2.3907	2.5841	2.5313	2.6203	---	1.9852	2.1599	2.2874	2.3825
Average total costs	---	3.8783	4.4426	5.0109	6.3399	---	3.2617	3.7556	4.4148	5.5737
		Poults	Poults	Poults	Poults		Poults	Poults	Poults	Poults
Number of salable poults per year	---	554,214	443,712	332,528	221,686	---	1,108,425	886,740	665,055	443,370

Continued--

See footnote at end of table.

Table 1.--Estimated hatching costs for six model hatcheries at various capacities, 52-week season--Cont.

Cost components	Plant C					Plant D				
	Total cost	Cost per poult				Total cost	Cost per poult			
		100% cap.	80% cap.	60% cap.	40% cap.		100% cap.	80% cap.	60% cap.	40% cap.
	Dollars	Cents	Cents	Cents	Cents	Dollars	Cents	Cents	Cents	Cents
Fixed costs										
Equipment depreciation 1/	6,135.52	0.3690	0.4613	0.6150	0.9226	9,786.04	0.3532	0.4414	0.5886	0.8829
Building depreciation	2,400.00	.1443	.1804	.2406	.3609	3,600.00	.1299	.1624	.2165	.3248
Building repairs and maintenance	1,455.00	.0875	.1094	.1459	.2188	2,190.00	.0790	.0988	.1317	.1976
Equipment repairs and maintenance	2,226.74	.1339	.1674	.2232	.3348	3,117.44	.1125	.1406	.1875	.2812
Taxes	1,103.00	.0663	.0829	.1106	.1659	1,771.46	.0639	.0799	.1065	.1598
Insurance	1,103.00	.0663	.0829	.1106	.1659	1,771.46	.0639	.0799	.1065	.1598
Interest	3,309.00	.1990	.2488	.3317	.4976	5,314.38	.1918	.2397	.3196	.4795
Miscellaneous costs	2,300.00	.1383	.1729	.2306	.3458	3,100.00	.1119	.1398	.1865	.2797
Average total fixed costs	---	1.2046	1.5060	2.0082	3.0123	---	1.1061	1.3825	1.8434	2.7653
Variable costs										
Utilities	---	.4964	.4964	.7250	.9250	---	.3869	.3869	.4964	.6797
Supplies	---	.5859	.5859	.6100	.6160	---	.5709	.5709	.5859	.6069
Labor:										
Full time	12,207.00	.7342	.9177	---	---	18,820.36	.6792	.8490	---	---
60% capacity	7,820.80	---	---	.7840	---	13,234.00	---	---	.7960	---
40% capacity	5,491.20	---	---	---	.8257	9,776.00	---	---	---	.8820
Average total variable costs	---	1.8165	2.0000	2.1190	2.3667	---	1.6370	1.8068	1.8783	2.1686
Average total costs	---	3.0211	3.5060	4.1272	5.3790	---	2.7431	3.1893	3.7217	4.9339
		Poults	Poults	Poults	Poults		Poults	Poults	Poults	Poults
Number of salable poults per year	---	1,662,636	1,330,109	997,582	665,054	---	2,771,060	2,216,848	1,662,636	1,108,424

Continued --

See footnote at end of table.

Table 1.--Estimated hatching costs for six model hatcheries at various capacities, 52-week season--Cont.

Cost components	Plant E					Plant F				
	Total cost	Cost per poult				Total cost	Cost per poult			
		100% cap.	80% cap.	60% cap.	40% cap.		100% cap.	80% cap.	60% cap.	40% cap.
	Dollars	Cents	Cents	Cents	Cents	Dollars	Cents	Cents	Cents	Cents
Fixed costs										
Equipment depreciation 1/	19,090.14	0.3445	0.4306	0.5741	0.8611	37,297.94	0.3365	0.4206	0.5608	0.8412
Building depreciation	6,300.00	.1137	.1421	.1895	.2842	10,450.00	.0943	.1178	.1571	.2357
Building repairs and maintenance	3,810.00	.0687	.0859	.1146	.1719	6,315.00	.0570	.0712	.0950	.1424
Equipment repairs and maintenance	5,443.15	.0982	.1228	.1637	.2455	9,104.91	.0821	.1027	.1369	.2054
Taxes	3,017.71	.0545	.0681	.0908	.1361	6,004.02	.0542	.0677	.0903	.1354
Insurance	3,017.71	.0545	.0681	.0908	.1361	6,004.02	.0542	.0677	.0903	.1354
Interest	9,053.13	.1634	.2042	.2723	.4084	18,012.06	.1625	.2031	.2708	.4063
Miscellaneous costs	5,200.00	.0938	.1173	.1564	.2346	10,500.00	.0947	.1184	.1579	.2368
Average total fixed costs	---	.9913	1.2391	1.6522	2.4779	---	.9355	1.1692	1.5591	2.3386
Variable costs										
Utilities	---	.3214	.3214	.3650	.3869	---	.2509	.2509	.3100	.3214
Supplies	---	.5603	.5603	.5670	.5709	---	.5503	.5503	.5585	.5603
Labor:										
Full time	36,600.72	.6604	.8255	---	---	72,134.40	.6508	.8135	---	---
60% capacity	25,654.72	---	---	.7715	---	50,269.44	---	---	.7559	---
40% capacity	18,647.72	---	---	---	.8412	36,346.44	---	---	---	.8198
Average total variable costs	---	1.5421	1.7072	1.7035	1.7990	---	1.4520	1.6147	1.6244	1.7015
Average total costs	---	2.5334	2.9463	3.3557	4.2769	---	2.3875	2.7839	3.1835	4.0401
		Poults	Poults	Poults	Poults		Poults	Poults	Poults	Poults
Number of salable poults per year	---	5,542,118	4,433,694	3,325,271	2,216,847	---	11,084,236	8,867,389	6,650,542	4,433,694

1/ Includes depreciation on office equipment at the rate of 10 percent per year.

Table 2.--Estimated hatching costs for six model hatcheries at various capacities, 34-week season

Cost components	Plant A					Plant B				
	Total cost	Cost per poult				Total cost	Cost per poult			
		100% cap.	80% cap.	60% cap.	40% cap.		100% cap.	80% cap.	60% cap.	40% cap.
	Dollars	Cents	Cents	Cents	Cents	Dollars	Cents	Cents	Cents	Cents
Fixed costs										
Equipment depreciation 1/	2,553.98	0.7988	0.9985	1.3313	1.9969	4,160.05	0.6505	0.8132	1.0842	1.6264
Building depreciation	900.00	.2815	.3519	.4691	.7037	1,700.00	.2658	.3323	.4431	.6646
Building repairs and maintenance	555.00	.1736	.2170	.2893	.4339	1,035.00	.1619	.2023	.2698	.4046
Equipment repairs and maintenance	1,454.81	.4550	.5688	.7583	1.1375	1,801.19	.2817	.3521	.4694	.7042
Taxes	456.37	.1427	.1784	.2379	.3568	790.63	.1236	.1545	.2061	.3091
Insurance	456.37	.1427	.1784	.2379	.3568	790.63	.1236	.1545	.2061	.3091
Interest	1,369.10	.4282	.5352	.7137	1.0705	2,317.89	.3709	.4636	.6182	.9273
Miscellaneous costs	500.00	.1564	.1955	.2606	.3909	1,500.00	.2346	.2932	.3909	.5864
Average total fixed costs	---	2.5789	3.2237	4.2981	6.4470	---	2.2126	2.7657	3.6878	5.5317
Variable costs										
Utilities	---	1.0550	1.0550	1.1460	1.1760	---	.9050	.9050	1.0500	1.1400
Supplies	---	.6225	.6225	.6280	.6340	---	.6140	.6140	.6200	.6260
Labor:										
Full time	2,581.19	.8073	1.0091	---	---	4,626.56	.7235	.9044	---	---
60% capacity	1,702.87	---	---	.8876	---	3,053.26	---	---	.7958	---
40% capacity	1,135.66	---	---	---	.8880	2,035.46	---	---	---	.7958
Average total variable costs	---	2.4848	2.6866	2.6616	2.6980	---	2.2425	2.4234	2.4658	2.5618
Average total costs	---	5.0637	5.9103	6.9597	9.1450	---	4.4551	5.1891	6.1536	8.0935
Number of salable poults per year	---	Poults 319,738	Poults 255,790	Poults 191,843	Poults 127,895	---	Poults 639,475	Poults 511,580	Poults 383,685	Poults 255,790

See footnote at end of table.

Continued--

Table 2.--Estimated hatching costs for six model hatcheries at various capacities, 34-week season--Cont.

Cost components	Plant C					Plant D				
	Total cost	Cost per poult				Total cost	Cost per poult			
		100% cap.	80% cap.	60% cap.	40% cap.		100% cap.	80% cap.	60% cap.	40% cap.
	Dollars	Cents	Cents	Cents	Cents	Dollars	Cents	Cents	Cents	Cents
Fixed costs										
Equipment depreciation 1/	6,135.52	0.6396	0.7996	1.0661	1.5991	9,786.04	0.6121	0.7652	1.0202	1.5303
Building depreciation	2,400.00	.2502	.3128	.4170	.6255	3,600.00	.2252	.2815	.3753	.5630
Building repairs and maintenance	1,455.00	.1517	.1896	.2528	.3792	2,190.00	.1370	.1712	.2283	.3425
Equipment repairs and maintenance	2,226.74	.2321	.2902	.3869	.5804	3,117.44	.1950	.2437	.3250	.4875
Taxes	1,103.00	.1150	.1437	.1917	.2875	1,771.46	.1108	.1385	.1847	.2770
Insurance	1,103.00	.1150	.1437	.1917	.2875	1,771.46	.1108	.1385	.1847	.2770
Interest	3,309.00	.3450	.4312	.5750	.8624	5,314.38	.3324	.4155	.5540	.8311
Miscellaneous costs	2,300.00	.2398	.2997	.3996	.5995	3,100.00	.1939	.2424	.3232	.4848
Average total fixed costs	---	2.0884	2.6105	3.4808	5.2211	---	1.9172	2.3965	3.1954	4.7932
Variable costs										
Utilities	---	.7500	.7500	.9558	1.0500	---	.4974	.4974	.7350	.9050
Supplies	---	.6050	.6050	.6113	.6200	---	.5869	.5869	.5970	.6060
Labor:										
Full time	7,387.38	.7701	.9627	---	---	11,483.68	.7183	.8979	---	---
60% capacity	5,409.60	---	---	.9399	---	8,019.50	---	---	.8360	---
40% capacity	4,110.40	---	---	---	1.0713	6,056.00	---	---	---	.9470
Average total variable costs	---	2.1251	2.3177	2.5070	2.7413	---	1.8026	1.9822	2.1680	2.4580
Average total costs	---	4.2135	4.9282	5.9878	7.9624	---	3.7198	4.3787	5.3634	7.2512
		Poults	Poults	Poults	Poults		Poults	Poults	Poults	Poults
Number of salable poults per year	---	959,213	767,370	575,527	383,685	---	1,598,688	1,278,950	959,213	639,475

Continued--

See footnote at end of table.

Table 2.--Estimated hatching costs for six model hatcheries at various capacities, 34-week season--Cont.

Cost components	Plant E					Plant F				
	Total cost	Cost per poult				Total cost	Cost per poult			
		100% cap.	80% cap.	60% cap.	40% cap.		100% cap.	80% cap.	60% cap.	40% cap.
	Dollars	Cents	Cents	Cents	Cents	Dollars	Cents	Cents	Cents	Cents
Fixed Costs										
Equipment depreciation 1/	19,090.14	0.5971	0.7463	0.9951	1.4926	37,297.94	0.5833	0.7291	0.9721	1.4581
Building depreciation	6,300.00	.1970	.2463	.3284	.4926	10,450.00	.1634	.2043	.2724	.4085
Building repairs and maintenance	3,810.00	.1192	.1490	.1986	.2979	6,315.00	.0988	.1234	.1646	.2469
Equipment repairs and maintenance	5,443.15	.1702	.2128	.2837	.4256	9,104.91	.1424	.1780	.2373	.3560
Taxes	3,017.71	.0944	.1180	.1573	.2360	6,004.02	.0939	.1174	.1565	.2347
Insurance	3,017.71	.0944	.1180	.1573	.2360	6,004.02	.0939	.1174	.1565	.2347
Interest	9,053.13	.2831	.3539	.4719	.7079	18,012.06	.2817	.3521	.4694	.7042
Miscellaneous costs	5,200.00	.1626	.2033	.2711	.4066	10,500.00	.1642	.2052	.2737	.4105
Average total fixed costs	---	1.7180	2.1476	2.8634	4.2952	---	1.6216	2.0269	2.7025	4.0536
Variable costs										
Utilities	---	.3879	.3879	.4360	.4974	---	.3150	.3224	.3650	.3879
Supplies	---	.5719	.5719	.5789	.5869	---	.5635	.5613	.5680	.5719
Labor:										
Full time	22,271.44	.6966	.8707	---	---	43,771.99	.6845	.8556	---	---
60% capacity	15,718.32	---	---	.8193	---	30,651.99	---	---	.7989	---
40% capacity	11,604.86	---	---	---	.9074	22,371.05	---	---	---	.8746
Average total variable costs	---	1.6564	1.8305	1.8342	1.9917	---	1.5630	1.7393	1.7319	1.8344
Average total costs	---	3.3744	3.9781	4.6976	6.2869	---	3.1846	3.7662	4.4344	5.8880
		Poults	Poults	Poults	Poults		Poults	Poults	Poults	Poults
Number of salable poults per year	---	3,197,376	2,557,901	1,918,426	1,278,950	---	6.394,752	5,115,802	3,836,851	2,557.901

1/ Includes depreciation on office equipment at the rate of 10 percent a year.

Table 3.--Quantity of equipment required for annual operation of six model turkey hatcheries at 100 percent of capacity

Type of equipment	Model A	B	C	D	E	F
	Units					
Vacuum-lift egg trayer	1	1	1	2	2	2
Tray carts	7	7	7	7	14	28
Poult box carts	4	4	8	8	15	32
Dirty-hatch-tray dollies	3	3	6	6	9	18
Egg-case dollies	4	4	4	8	8	8
Conveyor for egg cases	1-10'	1-10'	2-10'	3-10'	3-10'	3-10'
Worktable for candling, transfer, and take off	2	2	2	2	4	8
Central vacuum system	1	1	1	1	1	1
Incubators	4	7	11	18	36	72
Hatchers, large	2	4	5	9	18	36
Hatchers, small	1	1	---	---	---	---
Standby generators	1-15kw.	1-30kw.	1-55kw.	1-85kw.	(1-45kw.) (1-115kw.)	3-115kw.
Tray washer	---	---	---	1	1	1
Egg-room coolers	1-1 ton	1-1 ton	1-1 ton	1-1½ ton	2-1½ ton	2-1½ ton
Tray-washing equipment:						
Tub	1	1	2	---	---	---
High-pressure hose	1	1	2	---	---	---
Scrub brushes	3	3	6	---	---	---

Table 4.--Price per unit of equipment utilized in the annual operation of six model turkey hatcheries at 100 percent of capacity

Type of equipment	Model A	B	C	D	E	F
	Dollars					
Vacuum-lift egg trayer	494.62	494.62	494.62	1/799.44	1/799.44	1/799.44
Tray carts 2/	95.00	95.00	95.00	95.00	95.00	95.00
Poult box carts	25.00	25.00	25.00	25.00	25.00	25.00
Dirty-hatch-tray dollies	12.50	12.50	12.50	12.50	12.50	12.50
Egg-case dollies	12.50	12.50	12.50	12.50	12.50	12.50
Conveyor for egg cases per 10-foot section 2/	52.15	52.15	52.15	52.15	52.15	52.15
Worktable for candling, transfer, and take off	125.00	125.00	125.00	125.00	125.00	125.00
Central vacuum system	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Incubators	3,776.25	3,776.25	3,776.25	3,776.25	3,776.25	3,776.25
Hatchers, large	1,928.50	1,928.50	1,928.50	1,928.50	1,928.50	1,928.50
Hatchers, small	1,301.50	1,301.50	---	---	---	---
Standby generators	2,579.00	3,309.00	5,105.00	6,846.00	(1-9,115.00) (1-4,125.00)	9,115.00
Tray washer 3/	---	---	---	4,950.00	4,950.00	4,950.00
Egg-room cooler 3/	615.00	615.00	615.00	775.00	775.00	775.00

1/ Price of second unit equals $304.82.
2/ Price does not include shipping expense.
3/ Price does not include shipping and installation expenses.

Table 5.--Total investment in equipment utilized in the annual operation of six model turkey hatcheries at 100 percent of capacity

Type of equipment	Model					
	A	B	C	D	E	F
	Dollars					
Vacuum-lift egg trayer	494.62	494.62	494.62	799.44	799.44	799.44
Tray carts 1/	665.00	665.00	665.00	665.00	1,330.00	2,660.00
Poult box carts	100.00	100.00	200.00	200.00	375.00	800.00
Dirty-hatch-tray dollies	37.50	37.50	75.00	75.00	112.50	225.00
Egg-case dollies	50.00	50.00	50.00	100.00	100.00	100.00
Conveyor for egg cases 1/	52.15	52.15	104.30	156.45	156.45	156.45
Worktable for candling, transfer, and take off	250.00	250.00	250.00	250.00	500.00	1,000.00
Tray-washing equipment	30.00	40.00	60.00	---	---	---
Central vacuum system	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Incubators	15,105.00	26,433.75	41,538.75	67,972.50	135,945.00	271,890.00
Hatchers	5,158.50	9,015.50	9,642.50	17,356.50	34,713.00	69,426.00
Total	22,942.77	38,138.52	54,080.17	88,574.89	175,031.39	348,056.89
10-yr. depreciation rate-- annual depreciation	2,294.28	3,813.85	5,408.02	8,857.49	17,503.14	34,805.69
Other equipment:						
Standby generator 2/	2,579.00	3,309.00	5,105.00	6,846.00	13,240.00	27,345.00
Tray washer 2/	---	---	---	4,950.00	4,950.00	4,950.00
Egg-room cooler 2/	615.00	615.00	615.00	775.00	1,550.00	1,550.00
Total	3,194.00	3,924.00	5,720.00	12,571.00	19,740.00	33,845.00
20-yr. depreciation rate-- annual depreciation	159.70	196.20	286.00	628.55	987.00	1,692.25

1/ Does not include shipping cost.
2/ Does not include shipping and installation cost.

Table 6.--Quantity, price, and total cost of supplies utilized in the annual operation of six model turkey hatcheries at 100 percent of capacity

Supplies	Model					
	A	B	C	D	E	F
	Number of units					
Egg cases 1/	520	1,040	1,560	2,600	5,200	10,400
Tray paper-roll of 250 sheets	22	44	66	111	221	443
Boxes and lids	5,550	11,100	16,630	27,750	55,450	110,850
Pads	22,000	45,000	67,000	111,000	222,000	444,000
Fumigants - gallons	10	20	30	50	100	200
Detergents - lbs	100	200	300	500	1,000	2,000
Potassium permanganate-lbs	5	10	15	25	50	100
	PRICE PER UNIT					
	Dollars					
Egg cases - per case	.80	.80	.80	.75	.75	.75
Tray paper - per roll	19.45	19.45	19.45	19.45	19.45	19.45
Boxes and lids - per set	.38	.37	.35	.34	.33	.32
Pads-per 1,000	18.00	17.50	17.50	17.25	17.25	17.25
Fumigants - per gal	5.00	5.00	5.00	5.00	5.00	5.00
Detergents - per lb	.20	.20	.20	.20	.20	.20
Potassium permaganate - per lb	.50	.50	.50	.50	.50	.50
	TOTAL COST					
	Dollars					
Egg cases	416.00	832.00	1,248.00	1,950.00	3,900.00	7,800.00
Tray paper	427.90	855.80	1,283.70	2,158.95	4,298.45	8,616.35
Boxes and lids	2,109.00	4,107.00	5,820.50	9,435.00	18,298.50	35,472.00
Pads	396.00	787.50	1,172.50	1,914.75	3,829.50	7,659.00
Fumigants	50.00	100.00	150.00	250.00	500.00	1,000.00
Detergents	20.00	40.00	60.00	100.00	200.00	400.00
Potassium permaganate	2.50	5.00	7.50	12.50	25.00	50.00
Total	3,421.40	6,727.30	9,742.20	15,821.20	31,051.45	60,997.35

1/ Each egg case was used an average of 10 times before discarding.

Table 7.--Typical work schedule for a turkey hatchery producing one hatch a week, when infertile eggs are pulled on the ninth day of the hatching cycle

Day	Work performed
Sunday	Check machines
Monday	Set eggs of large set
	Pull large hatch, grade, count, and box poults
	Wash hatch trays by hand
Tuesday	Receive and store eggs
	Load out poults
	Clean hatchers
	Clean hatchery
	Grade and tray eggs for small set
Wednesday	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Pull small hatch, grade, count, and box poults
Thursday	Load out poults
	Transfer large set of eggs from incubator to hatchers
	Clean hatch trays and hatcher
Friday	Receive and store eggs
	Make poult boxes
	Clean hatchery
Saturday	Clean incubator
	Grade and tray eggs for large set
	Transfer and pull infertiles of small set

Table 8.--Typical work schedule for a turkey hatchery producing two hatches a week, settings on the third and seventh day with infertile eggs pulled on the ninth day of the hatching cycle

Day	Work performed
Sunday	Transfer and pull infertiles of small set
Monday	Load out Saturday's hatch
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Pull small hatch, grade, count, and box poults
	Clean hatch trays and hatchers
	Clean hatchery
	Make poult boxes
Tuesday	Receive and store eggs
	Load out poults
	Transfer large set of eggs from incubator to hatchers
	Grade and tray eggs for large set
	Clean incubator and set eggs of large set
	Pull large hatch, grade, count, and box poults
Wednesday	Receive and store eggs
	Load out poults
	Clean hatch trays and hatchers
	Clean hatchery
	Grade and tray eggs for small set
	Make poult boxes
Thursday	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Pull small hatch, grade, count, and box poults
	Transfer and pull infertiles of small set
Friday	Receive and store eggs
	Load out poults
	Transfer large set of eggs from incubator to hatchers
	Clean hatch trays
	Clean hatchery
	Grade and tray eggs for large set
	Make poult boxes
Saturday	Receive and store eggs
	Clean incubator and set eggs of large set
	Pull large hatch, grade, count, and box poults
	Clean hatch trays and hatchers
	Clean hatchery
	Grade and tray eggs for small set

Table 9.--Typical work schedule for a turkey hatchery producing three hatches a week, eggs set Monday, Wednesday, and Friday, with infertile eggs pulled on the eighth day of the hatching cycle

Day	Work performed
Sunday	Pull infertile eggs of small set and transfer to a hatcher
	Make poult boxes
Monday	Load out Saturday's hatch
	Receive and store eggs
	Grade and tray eggs
	Clean incubator
	Set eggs of large set
	Pull large hatch, grade, count, and box poults
	Transfer large set of eggs from incubator to hatchers
	Clean hatch trays and hatchers
Tuesday	Load out poults
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Pull small hatch, grade, count, and box poults
	Pull infertile eggs of small set and transfer to a hatcher
	Clean hatch trays
	Clean hatchery
	Make poult boxes
Wednesday	Load out poults
	Receive and store eggs
	Grade and tray eggs
	Clean incubator
	Set eggs of large set
	Pull large hatch, grade, count, and box poults
	Clean hatch trays and hatchers
	Make poult boxes
Thursday	Load out poults
	Transfer large set of eggs to hatchers
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Pull small hatch, grade, count, and box poults
	Clean hatch trays and hatcher
	Clean hatchery
Friday	Load out poults
	Receive and store eggs
	Grade and tray eggs
	Clean incubator
	Set eggs of large set
	Pull large hatch, grade, count, and box poults
	Pull infertile eggs and transfer small set to a hatcher
	Clean hatch trays and hatcher
Saturday	Load out poults
	Transfer large set of eggs to hatchers
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Pull small hatch, grade, count, and box poults
	Clean hatch trays and hatcher
	Clean hatchery

Table 10. Typical work schedule for a turkey hatchery producing five hatches a week, with infertile eggs pulled on the eighth day of the hatching cycle

Day	Work performed
Sunday	Transfer large set of eggs from incubator to hatchers
	Transfer and pull infertiles of small set
	Make poult boxes
Monday	Load out poults that were hatched on Saturday
	Receive and store eggs
	Clean incubator and set eggs of large set
	Pull large hatch, grade, count, and box poults
	Clean hatchers
	Transfer large set of eggs to hatchers
	Transfer and pull infertiles of small set
	Grade and tray eggs for Tuesday and Wednesday sets
	Clean hatch trays with a tray washer
	Clean hatchery
Tuesday	Load out poults
	Clean incubator and set eggs of large set
	Pull large hatch, grade, count, and box poults
	Pull small hatch, grade, count, and box poults
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Transfer and pull infertiles of small set
	Clean hatch trays and hatchers
	Make poult boxes
Wednesday	Load out poults
	Receive and store eggs
	Clean incubator and set eggs of large set
	Pull large hatch, grade, count, and box poults
	Pull small hatch, grade, count, and box poults
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Grade and tray eggs for Thursday, Friday, and Saturday sets
	Clean hatchery
Thursday	Load out poults
	Clean incubator and set eggs of large set
	Pull large hatch, grade, count, and box poults
	Pull small hatch, grade, count, and box poults
	Clean hatchers
	Transfer large set of eggs to hatchers
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Clean hatch trays
	Make poult boxes
Friday	Load out poults
	Clean incubator and set eggs of large set
	Pull large hatch, grade, count, and box poults
	Pull small hatch, grade, count, and box poults
	Clean hatchers
	Transfer large set of eggs to hatchers
	Transfer and pull infertiles of small set
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Clean hatch trays
	Clean hatchery

Continued --

Table 10.--Typical work schedule for a turkey hatchery producing five hatches a week, with infertile eggs pulled on the eighth day of the hatching cycle--Cont.

Day	Work performed
Saturday.....	Load out poults
	Receive and store eggs
	Pull small hatch, grade, count, and box poults
	Transfer large set of eggs to hatchers
	Transfer and pull infertiles of small set
	Pull infertile eggs of large set, shuffle eggs to obtain full trays
	Replace empty trays with full trays (small set)
	Grade and tray eggs for Monday set
	Clean hatchery

SELECTED BIBLIOGRAPHY

Analysis of Hatchery Costs of Selected Hatcheries Participating in the 1954 Hatchery Cost Survey. Compiled for use in Amer. Poultry and Hatchery Fed. Cost Clinic, St. Louis, Mo., July 20, 1955.

Anderson, Roice H. The Utah Turkey Industry - An Economic Appraisal. Agr. Expt. Sta. Bul. 445, Utah State Univ., Logan, Apr. 1964. 19 pp.

Bardwell, Edwin T. The Institutional Environment of New England Chicken Hatcheries. Agr. Econ. Res. Mimeo 27, Univ. N. H., Durham, in cooperation with Univ. Mass., Amherst, and Agr. Mktg. Serv., U.S. Dept. Agr., July 1961. 11 pp.

Bressler, R. G., Jr. "Research Determination of Economies of Scale." Jour. Farm Econ., Vol. 27, No. 3, Menasha, Wis., Aug. 1945.

Burbee, Clark R., and Bardwell, Edwin T. Marketing New England Poultry. 6. Economies of Scale in Hatching and Cost of Distributing Broiler Chicks. Agr. Expt. Sta. Bul. 483, Univ. N. H., Durham, in cooperation with Univ. Mass., Amherst, and Econ. Res. Serv., U.S. Dept. Agr., May 1964. 56 pp.

Burrier, A. S., Knowlton, F. L., and Selby, H. E. Costs of Producing Turkey Hatching Eggs in Oregon. Agr. Expt. Sta. Bul. 333, Oregon. State Col., Corvallis, Oct. 1934. 18 pp.

Byers, George B., MacLaury, D. W., and Insko, W. M., Jr. Effect of Work Methods, Equipment Design and Building Arrangement on Costs and Labor Efficiency in Hatching Operation. Agr. Expt. Sta. Bul. 680, Univ. Ky., Lexington, Oct. 1962. 24 pp.

Darrah, Lawrence B. Costs of Incubation and Rearing on Commercial Poultry Farms, 1940-41. Agr. Expt. Sta. Bul. 797, Cornell Univ., Ithaca, N.Y., June 1943. 31 pp.

Faber, Fred L. "What's New In How Chicks are Sold and Distributed." Feed and Farm Supplier, Mar. 1961.

Federal Trade Commission. Trade Practice Rules for the Poultry Hatching and Breeding Industry. Promulgated Feb. 22, 1961.

Fischer, Charles M. Influences of Hatcheries on Broiler Production in the Western States. Agr. Expt. Sta. Bul. 560, Oreg. State Col., Corvallis, in cooperation with Agr. Mktg. Serv., U.S. Dept. Agr., May 1957. 24 pp.

Gallimore, William W. Economies to Size in Hatching Chicks. Econ. Res. Serv., U.S. Dept. Agr. A report presented at Amer. Poultry and Hatchery Fed., St. Louis, Mo., July 18, 1962. 12 pp.

_____, and Stemberger, A. P. Commercial Practices of North Carolina Hatcheries. Agr. Econ. Prog. Rpt., N. C. State Col., Raleigh, in cooperation with Agr. Mktg. Serv., U.S. Dept. Agr., June 1961. 27 pp.

_____, and Stemberger, A. P. Economies to Size in Hatching Chicks. Agr. Econ. Inf. Ser. 96, N. C. State Col., Raleigh, in cooperation with Econ. Res. Serv., U. S. Dept. Agr., Nov. 1962. 47 pp.

Green, R. E. L., and Edman, Victor G. An Economic Study of Florida Hatcheries. Dept. Agr. Econ. Mimeo Rpt. EC 64-1, Univ. Fla., Gainesville, Oct. 1963. 64 pp.

Harper, W. W., and Penny, N. M. Marketing Eggs Through Hatcheries in Georgia. Agr. Expt. Sta. Mimeo Ser. 40, Experiment, Ga., Apr. 1952. 30 pp.

"Hatchery Factoryzation." Feed and Farm Supplier. June 1961.

Hinds, Russell H., Jr. Baby Chick Transportation Problems and Equipment. U.S. Dept. Agr., Mktg. Res. Rpt. 267, Agr. Mktg. Serv., Aug. 1958. 20 pp.

"How to Produce 300,000 Chicks per Week with Eight Men." Poultry and Egg Weekly, July 15, 1961.

Jones, Harold B. Economies of Scale in Commercial Egg Packing Plants. Agr. Expt. Sta. Bul. N.S. 120, Univ. Ga., Athens, in cooperation with Econ. Res. Serv., U.S. Dept. Agr., Sept. 1964. 98 pp.

Knudtson, A. C. "Estimating Economies of Scale." Jour. Farm Econ. Vol. 40, No. 3, Menasha, Wis., Aug. 1958.

Lyon, Gale H. Commercial Chick Hatcheries in South Carolina. Agr. Expt. Sta. Bul. 392, Clemson Col., Clemson, S.C., May 1951. 34 pp.

Maness, James C., and Roy, E. P. Economic Integration in the Hatching Industry. Dept. Agr. Econ. Cir. 301, La. State Univ., Baton Rouge, Feb. 1962. 46 pp.

Mortenson, W. P. Changes in the Poultry Industry, Effects on the Midwest. Agr. Expt. Sta. Bul. 560, and No. Cent. Reg. Res. Pub. 146, Madison, Wis., in cooperation with Econ. Res. Serv., U.S. Dept. Agr., Apr. 1963. 87 pp.

Mumford, D. Curtis. Costs and Net Returns in Producing Turkey Hatching Eggs. Agr. Expt. Sta. Bul. 524, Oregon State Col., Corvallis, Aug. 1952. 48 pp.

Naden, Kenneth D., and Jackson, George R., Jr. Price and Production Policies of California Broiler Chick Hatcheries. Agr. Expt. Sta. Mimeo Rpt. 171, Giannini Found. Agr. Econ., Univ. Calif., Los Angeles, in cooperation with Bur. Agr. Econ., U.S. Dept. Agr., Sept. 1954. 71 pp.

Penny, N. M., and Laurent, C. K. Commercial Hatchery Operations in Six Southern States. South. Coop. Ser. Bul. 34, Ala. Polytech. Inst., Auburn, in cooperation with Bur. Agr. Econ., U. S. Dept. Agr., July 1953. 42 pp.

Pierce, Walter H., and Jones, J. R. An Economic Analysis of Hatching Egg Production, Southwestern North Carolina. Agr. Econ. Inf. Ser. 45, N. C. State Col., Raleigh, Sept. 1955. 97 pp.

Rinear, Earl H. Problems of Transporting and Marketing Hatching Eggs and Baby Chicks in the Northeastern States. U. S. Dept. Agr., Prod. and Mktg. Admin. Apr. 1950. 29 pp.

_____. The Hatchery Industry - Structure - Economic Changes - Problems. U.S. Dept. Agr., Mktg. Res. Rpt. 483, Agr. Mktg. Ser., June 1961. 31 pp.

Rogers, George B. Economic Problems of the Hatchery Industry. Agr. Mktg. Serv., U.S. Dept. Agr. A report presented at Amer. Poultry and Hatchery Fed., Memphis, Tenn., July 20, 1960. 13 pp.

_____, and Bardwell, Edwin T. Marketing New England Poultry: 2. Economies of Scale in Chicken Processing. Agr. Expt. Sta. Bul. 459, Univ. N. H., Durham, in cooperation with Univ. Mass., Amherst, and Agr. Mktg. Serv., U.S. Dept. Agr., Apr. 1959. 58 pp.

_____, and Rinear, Earl H. Costs and Economies of Scale in Turkey Processing Plants. U.S. Dept. Agr., Mktg. Res. Rpt. 627, Econ. Res. Serv., Sept. 1963. 61 pp.

Smith, H. D., Poffenberger, R. R., and De Vault, S. H. The Marketing of Hatching Eggs, Chicks and Broilers in the Del-Mar-Va Area. Agr. Expt. Sta. Bul. A-52, Univ. Md., College Park, in cooperation with Prod. and Mktg. Admin., U.S. Dept. Agr., June 1950. 24 pp.

Thor, Eric. Economies of Scale in the Operation of Florida Citrus Packinghouses. Agr. Expt. Sta. Bul. 606, Univ. Fla., Gainesville, in cooperation with Agr. Mktg. Serv., U.S. Dept. Agr., Jan. 1959. 39 pp.

United States Department of Agriculture, Agricultural Research Service. Participants in the National Turkey Improvement Plan. Agr. Res. Serv. Rpt. 44-8, revised Feb. 1962. 72 pp.

_____, Economic Research Service, Statistical Reporting Service, Agricultural Marketing Service. Egg and Poultry Statistics through mid-1961. Statis. Bul. 305, Mar. 1962. 185 pp.

_____, Statistical Reporting Service. Farm Production Disposition and Gross Income - Turkeys 1962-63, by States. Pou 3-1 (64), Apr. 1964. 11 pp.

_____, Statistical Reporting Service. Hatchery Production. Crop Rptg. Board, Pou 1-1-1 (3-63), Mar. 15, 1963. 18 pp.

Warren, E. L., and Wermel, M. T. An Economic Survey of the Baby Chick Hatchery Industry. U.S. Dept. Agr., Agr. Adjust. Admin. Bul. G-33, May 1, 1935. 64 pp.

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